Description for the general public

The key to discovering new pharmaceuticals, modern materials and renewable fuel sources is the availability of synthetic methods with the ability to effect the rapid construction of (or even deconstruction in the case of some biofuels) molecular structures in an efficient and selective manner. Olefin metathesis is an extremely proficient and clean way of redistributing carbon-carbon double bonds, breaking old bonds and making new bonds in the process; as such it has emerged as one of the most powerful techniques in the chemist's tool box. However, challenges still remain and there is an ever growing need for more active, robust, selective and easy to handle catalysts to mediate the ever increasing number of olefin metathesis applications. The proposed research focuses on the synthesis of novel olefin metathesis catalysts that are designed to (i) be compatible with the most challenging olefin based start materials (ii) control the geometry of the highly prized product molecules. We also propose a new synthetic route to phosphine (III) based ligands and compounds which will facilitate the construction of new molecules with implications not just for olefin metathesis but for synthetic chemistry in general. Through completion of this basic but progressive research we will gain a better understanding of the important factors governing the performance of olefin metathesis, this in turn will have implications for the development of future pharmaceuticals, modern materials and fuels; thus society at large.